|  |  |  |
| --- | --- | --- |
| **Environments** | **Investigation 1:** | **Terrestrial Environments** |

|  |
| --- |
| **How this investigation fits within the Concept and Lesson Map:** |
| This investigation serves as a way to elicit student preconceptions about what living things need to survive. It is not necessary that all students have the same plan or outcome from this investigation. There is added value in coming back to this investigation after investigation #3, as the terrariums continue to grow as well as the complexity of ideas surrounding the students understanding of environmental factors. |

|  |
| --- |
| **Overarching Question(s) for the Whole Investigation** |
| What do plants need to sprout and survive? |

**How People Learn #1: Preconceptions**

|  |
| --- |
| **Eliciting Student Ideas:** |
| * Conversation starter: “Have you ever tried to keep something alive?” (Refer to Chapter 5 in Ready Set Science, “Making Thinking Visible: Talk and Argument”) * Concept Map: “Environment” - Ask students to pick a terrestrial environment (forest, desert, tundra, mountain, etc.) that is familiar to them. Brainstorm a list of important parts for that environment. Place each part in a circle somewhere on the page and ask students to draw lines to show connections. Label the lines to explain connections. (see example) * Pre Assessment: Needs of Seeds Formative Assessment from Uncovering Student Ideas in Science Vol. 2 p. 101 Page Keeley * Concept Cartoon: Seeds in the Dark 6.10 Concept Cartoons in Science Education p. 29 Stuart Naylor and Brenda Keogh. |

|  |
| --- |
| **Common Student Preconceptions:** |
| * Some students will believe that plants need light for all parts of their life cycle although seeds in the dark and underground will still sprout. * They might also assume that different plants need the same amounts of water and this assumption will influence how much water they choose to use in their terrarium. |

**How People Learn #2: Facts/Concepts/Knowledge**

|  |  |
| --- | --- |
| **WA State Content Standards “Science Domains” (EALR 4)** | |
| 4-5 LS2A | An *ecosystem* includes all of the plant and animal *populations* and nonliving resources in a given area. Plants and animals depend on one another and the nonliving resources in their *ecosystem* to help them survive. |
| **WA State Science Standards “Crosscutting Concepts and Abilities” (EALRs 1-3)** | |
| 2-3 SYSA | A system is a group of interacting parts that form a whole. |

|  |
| --- |
| **Key Understandings for the Teacher:** |
| The terms ecosystem and environment are interchangeable at this level. WA standards use ecosystem and FOSS uses environment for the same concept. FOSS uses the term “environments” to lead students to an understanding of “ecosystems.” Both are composed of the living and non-living components. Changes in any component will have effects on other components. |

**How People Learn #3: Metacognition**

|  |
| --- |
| **Metacognition: How did my thinking change? What caused the change? How did I come to believe this?** |
| * Revise concept map with new ideas and dates on a periodic basis. * Coming back to this investigation after lesson 3 and at the end of the unit would help students understand how their ideas have changed over time. |

**Continued on** **back**

|  |
| --- |
| **Evidence of Student Understanding:** |
| Students should have detailed descriptions and observations of the terrarium environment as it changes over time recorded in their science notebooks. Examples of entries could include: drawings of entire terrarium with labels and/or labeled drawings of specific parts that have changed over time; growing list of short observational notes with dates/times; written record of amount of water added to terrarium and placement of water. |

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Additional Information**

|  |
| --- |
| **Materials and Student Management** |
| * Make sure you have ordered your organisms for investigations 2 and 4 as these can sometimes take 4-6 weeks for delivery. Contact Linda Pollino for an organisms card. You will need to call Delta Education with card information. * Barley has a narrow range of tolerance for moisture, as it prefers a moist/dry environment. * It is okay to let students make their own choices even if it may not “work” |

|  |
| --- |
| **Timing Considerations** |
| * Keep in mind that the terrariums are used for approximately one month as students do investigations 2 and 3. Students will need time periodically to observe, record, and possibly alter their terrarium environments. * The FOSS Overview folio suggests a minimum of 10 weeks to complete the investigations for the Environments Module. When a teacher embeds important elicitation, metacognition, technology and formative assessment strategies to improve student understandings the module will take longer to complete. |

|  |
| --- |
| **Helpful Resources and Bibliography:** |
| * Washington Edition: Assessment Environments, Grade 5 Version (Updated formative assessment packet, 2006) * Concept Cartoons in Science Education (Naylor and Keogh, 2000) * Uncovering Student Ideas in Science (Keeley, Eberle, Tugel, 2007) * Science Curriculum Topic Study: Ecosystems, pg. 127 (Keeley, 2005) * Atlas of Science Literacy, V2. (American Association for Advancement of Science, 2007) * Ready Set Science (Michaels, Shouse, Schweingruber, 2008) |